

WASHINGTON DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
FRESHWATER MONITORING UNIT
STREAM DISCHARGE TECHNICAL NOTES

STATION ID: 19C060
STATION NAME: West Twin River
WATER YEAR: WY2007
AUTHOR: Casey Clishe

Introduction

Watershed Description

The West Twin River station is a stand-alone, continuously recording gaging station that has been operating since June 2004 in Water Resource Inventory Area (WRIA) 19. Like the other two drainages within the Strait of Juan de Fuca complex (East Twin River and Deep Creek) , West Twin River is very dynamic and carries substantial loads of bed material and large woody debris during precipitation--driven storm events which typically occur from November through February. The basin geology is composed of Crescent Formation volcanic rock in the upper watershed, marine sedimentary rock in the lower watershed, and terraces of glacial deposits in the lower floodplain (ONF 2002).

Gage Location

The gaging station is located in Clallam County, Washington approximately 20 miles west of Port Angeles. The station is on the left bank approximately 0.2 miles upstream from the mouth.

Table 1. Basin Area and Legal Description

Drainage Area (square miles)	12.7
Latitude (degrees, minutes, seconds)	48 09 47
Longitude (degrees, minutes, seconds)	123 57 10

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	32
Median Annual Discharge (cfs)	11
Maximum Daily Mean Discharge (cfs)	194
Minimum Daily Mean Discharge (cfs)	2.7
Maximum Instantaneous Discharge (cfs)	232
Minimum Instantaneous Discharge (cfs)	2.5
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	98
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	3.9
Number of Days Discharge is Greater Than Range of Ratings	6
Number of Days Discharge is Less Than Range of Ratings	0
Number of Un-Reported Days	120
Number of Days Qualified as Estimates	12
Number of Modeled Days	0

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

Table 2 Discussion (Discharge Statistics)

The most significant circumstance related to predicted discharge for WY2007 was the large number of days (120) that were not included in the annual statistics calculations. Given that the vast majority of these days did not report during periods of higher discharge, all annual statistics will be lower than the actual values. The large number of missing days for the Water Year renders the annual statistics displayed above almost meaningless for inclusion in future trend analysis. On February 6, 2007, after severe erosion and station damage, the station was physically moved approximately 50 meters upstream. The final knockout blow to the gaging station was delivered by a moderately large storm in November 2006. After the station was moved in February, a series of moderate to small precipitation events elevated West Twin River discharge. A relatively large event for the summer months in late July 2007 elevated baseflow.

Table 3. Error Analysis Summary.

Potential Logger Drift Error (% of discharge)	1.8
Potential Weighted Rating Error (% of discharge)	6.4
Total Potential Error (% of discharge)	8.2

Table 3 Discussion (Error Analysis)

Total Potential Error (TPE) is the cumulative value of the potential logger drift error and the potential weighed rating error. Error surrounding any predicted discharge value is acquired in a number of ways, ranging from variability in the quality of any particular discrete discharge measurement to the operational performance of a datalogger and the sonde measuring stage. Total Potential Error defines the expected range for any predicted discharge value. For example, if the TPE is 10.0 % and the predicted discharge value is 100 cfs, the range in which the actual predicted value lies is 90 to 110 cfs. For 174 of the recorded days, the agreement between the stage on the logger and discrete observations of the primary gage index met standards defining stable drift. Zero days were quality coded as estimated due to logger drift error exceedances.

Table 4. Stage Record Summary

Minimum Recorded Stage (feet)	1.59
Maximum Recorded Stage (feet)	7.61
Range of Recorded Stage (feet)	6.02

Table 4 Discussion (Stage Record)

The gaging station was physically moved again to a third location in less than three years. For this reason, the stage record is incomplete for WY2007. Three relatively small gaps in the stage data due to equipment and power supply failures were filled using regressed stage data from nearby gaging stations. During WY2007, discrepancies between the observed value of the primary gage index and the logged stage value were reconciled by manual adjustment of the continuous stage record for most of the water year. On August 14, 2007, automated adjustment of the stage record using the data shift function was initiated.

Table 5. Rating Table Summary

Rating Table No.	4	5	6
Period of Ratings	10/01-02/06	02/06-03/15	03/11-07/23
Range of Ratings (cfs)	1.8-69	2.2-338	3.9-338
No. of Defining Measurements	2	4	3
Rating Error (%)	5.4	6.1	7.6

Rating Table No.	501		
Period of Ratings	7/19-09/30		
Range of Ratings (cfs)	2.2-338		
No. of Defining Measurements	4		
Rating Error (%)	6.1		

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Table 5 Discussion (Rating Tables)

Rating Table 4 predicts discharge for the period during which the station was moved to the second location. Only two discharge measurements were conducted during this period, making the rating minimally robust. For this reason, rating Table 4 is completely independent of other ratings, quality coded as estimated for its predictive period, and will not phase into rating Table 5. Three additional ratings were needed to assist in predicting discharge for the remainder of WY2007.

Table 6. Model Summary

Model Type (Slope conveyance, other, none)	none
Range of Modeled Stage (feet)	
Range of Modeled Discharge (cfs)	
Valid Period for Model	
Model Confidence	

Table 6 Discussion (Modeled Data)

Due to the extremely dynamic nature of the channel, the West Twin River is a poor candidate for hydrologic modeling.

Table 7. Survey Type and Date (station, cross section, longitudinal)

Type	Date
Station	10/02/2007

Table 7 Discussion (Surveys)

This is the first survey conducted at the new (third) station location.

Activities Completed

The station was again physically moved on February 6 th , 2007.
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